

REMARKS

Status of the Claims

Claims 1-17 are pending, with claims 1 and 15 being independent. Claim 5 has been amended to even more clearly recite and distinctly claim the present invention. Support for the amendment to claim 5 can be found throughout the specification including, for example, in the original claims and at page 13, lines 26-28. Therefore, no new matter has been added.

Applicant respectfully requests the Examiner to reconsider and withdraw the outstanding rejections in view of the foregoing amendments and the following remarks.

Restriction Requirement

Applicants affirm the election of Group I, namely claims 1-17. Claims 18-20 have been canceled herein without prejudice to or disclaimer of the subject matter contained therein as directed to non-elected subject matter. Applicants expressly reserve the right to file one or more divisional applications directed to the subject matter of claims 18-20.

Claim Rejections Under 35 U.S.C. § 103

Claims 1-17 stand rejected under 35 U.S.C. § 103(a) as allegedly being unpatentable over U.S. Patent No. 6,512,018 ("Kennedy") in view of RU2089533 ("Mysov"). Applicants respectfully disagree with the rejection; therefore, this rejection is respectfully traversed.

Kennedy discloses a Fischer-Tropsch-based process and system for converting light hydrocarbons into heavier hydrocarbons using a plurality of different synthesis gas generators. (Abstract). Kennedy discloses reducing the amount of natural gas required to produce a given quantity of product by producing CO, a component of syngas, from

recycled CO₂. The process of Kennedy includes preparing a first synthesis gas having a H₂:CO ratio greater than 2:1; removing a portion of the hydrogen from the first synthesis gas; preparing a second synthesis gas with a CO₂ recycle wherein the second synthesis gas has a H₂:CO ratio less than 2:1; adding the removed hydrogen to the second synthesis gas to increase the H₂:CO ratio of the second synthesis gas; and using Fischer-Tropsch reactions to convert the first synthesis gas and the second synthesis gas to heavier hydrocarbons. (Abstract).

Specifically, Kennedy discloses and illustrates a first synthesis gas subsystem coupled to a first Fischer Tropsch synthesis reactor and a second synthesis gas subsystem coupled to a second Fischer Tropsch synthesis reactor (Figure 1 and Col. 4, line 3 – Col. 5, line 6). As such, Kennedy discloses *two Fischer Tropsch reaction systems*, each with a *separate syngas generator*.

Mysov merely discloses converting CO₂ into hydrocarbonaceous products using dual functional syngas conversion catalysts. Accordingly, Mysov merely discloses dual functional syngas conversion or modern “Isosynthesis.” Dual functional syngas conversion or “Isosynthesis” is a syngas conversion process distinct from Fischer Tropsch synthesis. In dual functional syngas conversion syngas is converted to higher molecular weight products via a methanol intermediate.

In contrast, the presently claimed invention relates to processes for conversion of syngas with reduced CO₂ emissions comprising a *single syngas generator* and two different syngas conversion reactors – a *Fischer-Tropsch reactor* and a *dual functional syngas conversion reactor*.

Specifically, independent claim 1 recites a process for the conversion of syngas using a Fischer-Tropsch reactor comprising forming a *first syngas*; reacting at least a portion of the first syngas containing at least about 2 vol% CO₂ in a *Fischer-Tropsch reactor* to form a first hydrocarbonaceous product and a *second syngas* comprising at least about 2 vol% CO₂; mixing the second syngas with a hydrogen-containing stream to provide an *adjusted syngas* having a molar ratio of H₂:(CO+CO₂) of at least about 1.0; reacting at least a portion of the adjusted syngas in a *dual functional syngas conversion reactor* to form a second hydrocarbonaceous product and a *third syngas* comprising a reduced amount of CO₂ than was present in the adjusted syngas.

Accordingly, as recited in independent claim 1, the presently claimed process comprises *two different syngas conversion reactions* (i.e., a Fischer-Tropsch conversion and a dual functional syngas conversion). Also as recited in independent claim 1, the presently claimed process comprises a *single syngas generator* (which forms the claimed first syngas); the other syngases recited in the claim are by-product streams of the syngas conversion reactions – of the Fischer-Tropsch reactor (i.e., the second syngas) and of the dual functional syngas conversion reactor (i.e., the third syngas). The by-product stream of the Fischer-Tropsch reaction is used to form the *adjusted syngas*, which is reacted in the dual functional syngas conversion reactor.

Independent claim 15 recites a process for the conversion of syngas using a Fischer-Tropsch reactor comprising forming a first syngas; reacting at least a portion of a blended syngas, comprising at least a portion of the first syngas and containing at least about 2 vol% CO₂, in a *Fischer-Tropsch reactor* to form a first hydrocarbonaceous product and a second syngas comprising at least about 2 vol% CO₂; mixing the second syngas with a hydrogen-containing stream to provide an adjusted syngas having a molar ratio of H₂:(CO+ CO₂) of at least about 1.0; reacting at least a portion of the adjusted syngas in a *dual functional syngas conversion reactor* to form a second hydrocarbonaceous product and a third syngas comprising a reduced amount of CO₂ than was present in the adjusted syngas; and blending at least a portion of the third syngas with at least a portion of the first syngas to form the blended syngas.

Accordingly, as recited in independent claim 15, the presently claimed process comprises *two different syngas conversion reactions* (i.e., a Fischer-Tropsch conversion and a dual functional syngas conversion). Also as recited in independent claim 15, the presently claimed process comprises a *single syngas generator* (which forms the claimed first syngas); the other syngases recited in the claim are by-product streams – of the Fischer-Tropsch reactor (i.e., the second syngas) and of the dual functional syngas conversion reactor (i.e., the third syngas). The by-product stream of the Fischer-Tropsch reaction is used to form the *adjusted syngas*, which is reacted in the dual functional syngas conversion reactor.

To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or

in the knowledge generally available to one of ordinary skill in the art, to combine the reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. MPEP § 2143.

It is respectfully submitted that even if there were some suggestion or motivation to combine Kennedy with Mysov and a reasonable expectation of success, even if combined Kennedy and Mysov do not disclose or suggest all of the claim limitations of the presently claimed processes for the conversion of syngas. As described above, Kennedy discloses *two Fischer Tropsch reaction systems*, each with a *separate syngas generator*. Also as described above, Mysov merely discloses converting CO₂ into hydrocarbonaceous products using dual functional syngas conversion catalysts.

Accordingly, even if combined, Kennedy and Mysov do not disclose or suggest processes for the conversion of syngas comprising one each of *two different syngas conversion reactions* (i.e., a Fischer-Tropsch conversion and a dual functional syngas conversion) and a *single syngas generator* (which forms the claimed first syngas) with other syngases being utilized that are *by-product streams* of the two different syngas conversion reactions. Moreover, even if combined, Kennedy and Mysov do not disclose or suggest processes for the conversion of syngas comprising forming an adjusted syngas from the by-product syngas stream of a Fischer-Tropsch reaction and reacting the adjusted syngas in a dual functional syngas conversion reactor.

As such, it is respectfully submitted that even if combined, Kennedy and Mysov do not disclose or suggest a process for the conversion of syngas comprising forming a *first syngas*; *reacting* at least a portion of the *first syngas containing* at least about 2 vol% CO₂ in a *Fischer-Tropsch reactor* to form a first hydrocarbonaceous product and a *second syngas* comprising at least about 2 vol% CO₂; mixing the second syngas with a hydrogen-containing stream to provide an *adjusted syngas* having a molar ratio of H₂:(CO+CO₂) of at least about 1.0; *reacting* at least a portion of the *adjusted syngas* in a *dual functional syngas conversion reactor* to form a second hydrocarbonaceous product and a *third syngas* comprising a reduced amount of CO₂ than was present in the adjusted syngas.

It is further respectfully submitted that even if combined, Kennedy and Mysov do not disclose or suggest a process for the conversion of syngas comprising forming a ***first syngas***; ***reacting*** at least a portion of a blended syngas, comprising at least a portion of the ***first syngas*** and containing at least about 2 vol% CO₂, in a ***Fischer-Tropsch reactor*** to form a first hydrocarbonaceous product and a ***second syngas*** comprising at least about 2 vol% CO₂; mixing the second syngas with a hydrogen-containing stream to provide an ***adjusted syngas*** having a molar ratio of H₂:(CO+ CO₂) of at least about 1.0; ***reacting*** at least a portion of the ***adjusted syngas*** in a ***dual functional syngas conversion reactor*** to form a second hydrocarbonaceous product and a ***third syngas*** comprising a reduced amount of CO₂ than was present in the adjusted syngas; and blending at least a portion of the third syngas with at least a portion of the first syngas to form the blended syngas.

In addition, it is respectfully submitted that there is no suggestion or motivation to combine Kennedy with Mysov. As described above, Kennedy discloses ***two Fischer Tropsch reaction systems***, each with a ***separate syngas generator***. Also as described above, Mysov discloses converting CO₂ into hydrocarbonaceous products using ***dual functional syngas conversion*** catalysts. Dual functional syngas conversion or "Isosynthesis" is a syngas conversion process ***distinct*** from Fischer Tropsch synthesis. In dual functional syngas conversion syngas is converted to higher molecular weight products via a ***methanol*** intermediate. It is respectfully submitted that Kennedy does not disclose or suggest dual functional syngas conversion; Kennedy merely relates to Fischer Tropsch reaction systems. Accordingly, it is respectfully submitted that there is no suggestion or motivation to combine the Fischer Tropsch reaction systems of Kennedy with the dual functional syngas conversion of Mysov. The Office Action has merely attempted to abstract individual teachings from the different pieces of prior art to create the combination upon which the rejection of the present claims is based. This is an error as a matter of law. *W.L. Gore & Associates v. Garlock, Inc.*, 721 F.2d 1540, 1552, 220 USPQ 303, 312 (Fed. Cir. 1983).

Moreover, Applicants respectfully submit that using a dual functional syngas conversion catalyst in the process and system of Kennedy would render Kennedy unsatisfactory for its intended purpose. If proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no

suggestion or motivation to make the proposed modification. *In re Gordon*, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984). MPEP § 2143.01.

Specifically, Kennedy discloses reducing the amount of natural gas required to produce a given quantity of product by producing CO, a component of syngas, from recycled CO₂. In contrast, Mysov discloses converting CO₂ into hydrocarbonaceous products using dual functional syngas conversion catalysts. Were a dual functional syngas conversion catalyst to be used in the process and system of Kennedy, CO₂ would be converted into hydrocarbonaceous products and would not be available for recycle to produce CO to reduce the amount of natural gas required to produce a given quantity of product. Accordingly, Applicants respectfully submit that using a dual functional syngas conversion catalyst in the process and system of Kennedy would render Kennedy unsatisfactory for its intended purpose.

Moreover, it is respectfully submitted there is no reasonable expectation of success in combining the two Fischer Tropsch reaction systems, each with a separate syngas generator, of Kennedy with the dual functional syngas conversion of Mysov. Dual functional syngas conversion or “Isosynthesis” is a syngas conversion process *distinct* from Fischer Tropsch synthesis. In dual functional syngas conversion syngas is converted to higher molecular weight products via a *methanol* intermediate. It is respectfully submitted that Kennedy does not disclose or suggest dual functional syngas conversion; Kennedy merely relates to Fischer Tropsch reaction systems. Thus, there is no reasonable expectation of success in combining the Fischer Tropsch reaction system of Kennedy with the dual functional syngas conversion of Mysov. Therefore, without an expectation of success in combining features of Kennedy with Mysov, such a combination is improper and results in impermissible hindsight.

For at least the above described reasons, withdrawal of the rejection under 35 U.S.C. § 103(a) is respectfully requested.

Conclusion

Without conceding the propriety of the rejections, the claim 5 has been amended, as provided above, to even more clearly recite and distinctly claim Applicants' invention.

For the reasons noted above, the art of record does not disclose or suggest the inventive concept of the present invention as defined by the claims.

In view of the foregoing amendments and remarks, reconsideration of the claims and allowance of the subject application is earnestly solicited. In the event that there are any questions relating to this application, it would be appreciated if the Examiner would telephone the undersigned attorney concerning such questions so that prosecution of this application may be expedited.

In the event any further fees are due to maintain pendency of this application, the Examiner is authorized to charge such fees to Deposit Account No. 02-4800.

Respectfully submitted,

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